

FOREST/WILDLIFE
GUIDELINES AND STANDARDS
FOR NOVA SCOTIA
May 1999 Draft

INTRODUCTION

This publication is a revision of the document Forest/Wildlife Guidelines and Standards for Nova Scotia, released in 1989. Since that time research and experience have expanded our knowledge of the relationships between wildlife and forestry activities to the extent that some modification and clarification of the Guidelines and Standards is required.

There have also been changes in the way the forest industry is responding to public concerns about environmental impacts and a need to include a wide variety of forest uses and values in forest management. Criteria and indicators for sustainable forestry have been drafted by the Canadian Council of Forest Ministers and are being adopted by a large segment of the industry for the maintenance of biological diversity in a healthy productive forest. The Forest/Wildlife Guidelines and Standards support this effort in part by defining some provincial standards for the maintenance and protection of wildlife habitat.

In this document the term wildlife is expanded to include all wild mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, fungi, algae, bacteria, and other wild organisms. We can identify most of the mammals, birds, fish, reptiles and amphibians that inhabit our forests but we are still discovering new plants, insects and smaller organisms every year. Our only means of conserving the species we haven't discovered yet is to protect their habitats by maintaining and restoring the variety of forest habitats found historically in Nova Scotia.

Our view of the forest has also expanded, moving from a focus on the woodlot and the wildlife habitats within it, to an interest in the landscape and the relationships between woodlots. We know wildlife does not recognize these artificial boundaries of ownership since a species can move many kilometres to find the habitats it needs. Therefore we must pay attention to how forestry activities on Nova Scotia's many small private woodlots affect the province's supply of wildlife habitats in the larger forest landscape. Not every woodlot can provide all the elements of biodiversity. Instead forest managers must combine the goals and objectives of individual landowners into a plan for the health and productivity of the forest landscape. This is a responsibility Nova Scotians must accept given our province's complex land ownership pattern and our commitment to maintaining biodiversity.

These Guidelines and Standards are designed to maintain or enhance fish and wildlife habitats in the forest environment. They are to be implemented on Crown lands and incorporated into forest management programs for private lands. Since all Nova Scotians have an interest in protecting wildlife habitats, these Guidelines and Standards are designed for use on all forest lands in Nova Scotia. As new information about forest management/wildlife interaction becomes available it will be considered for inclusion in future revisions.

Forest planners, managers, consultants, contractors, woodworkers and others needing assistance in interpreting and implementing these guidelines are encouraged to contact the wildlife biologist or forestry staff through the nearest office of the Department of Natural Resources.

FOREST HABITATS

Forest types

A great variety of animals, plants and other organisms find a home in our forests and each wildlife species has its preferred habitats. In an area of black spruce on poorly drained soil you will find a different wildlife community than in towering old growth hemlocks. A large open clearcut has species that are not found in a multi-storied stand managed with selection harvest methods. Wildlife habitat requirements may also change through the seasons and through the life of animals. Some or all of these requirements may be met in a single type of forest, but a variety of forest types will provide habitats for a variety of animals. Some species are very general in their habitat needs living in a wide variety of forest types. Others are specialists with very specific habitat requirements; a trait that often means they are on a list of rare or endangered species.

Succession

Forest succession is the progressive change in plant and animal communities over time. The natural change follows a pattern that depends on how the forest began (following agriculture, cutting, fire, insect or storm damage) and on the climate and soils. Each successional stage provides animals with different habitat conditions and supports a different community of wildlife. For wildlife purposes, successional stages can be grouped into the following five stages:

1. Forest openings - Grasses and herbaceous plants used by many wildlife species including white-tailed deer, snowshoe hare (rabbits) and woodcock.
2. Shrub-sapling - Provides woody browse for deer and other mammals and nesting cover for birds. It also provides fruiting shrubs and trees (blueberries, raspberries, pin cherry, shadbush, etc.).
3. Pole timber - Less valuable as wildlife habitat but used by some wildlife species for food and cover.
4. Mature timber - Mature softwood trees provide winter cover by blocking wind and reducing snow depth. They also provide escape cover and are vital for marten, fisher, squirrels and many bird species.
5. Old growth - Large old trees are used as nesting sites for large birds such as great horned owl, bald eagle and pileated woodpecker. Trunk cavities are used as den sites by many species. Old trees die, becoming snags and eventually fallen logs that are used as feeding and nesting site. The openings created soon fill with young growth, adding diversity to the stand.

During natural forest succession pioneer tree species will eventually be replaced by climax species. On a dry productive site with mild climate balsam fir, pin cherry and white birch will eventually die out and be replaced with red spruce, hemlock and white pine. On a hardwood site, aspen and birch will be replaced over time with sugar maple, yellow birch and perhaps beech.

When you establish a new forest, tree seedlings that result from natural regeneration are preferred because they carry genetic material that has proven to be most successful over many generations. Their ancestors are the trees that adapted to the soils and climate of the site and survived to produce seed. By encouraging natural regeneration you are maintaining the natural biodiversity of our forests. Natural regeneration followed by thinning to promote climax species has other benefits too.

The climax species are generally more valuable for wood products. With no natural or human caused disturbance the old growth forest of climax species is very stable and will change little over time. Old trees die, becoming snags and eventually fallen logs that return nutrients to the soil. The openings created soon fill with young growth, creating a forest with a diversity of tree ages and many layers in the canopy. In larger old growth stands there is very little air movement, high humidity and relatively stable temperatures. These conditions favour plants and animals that can not live in younger forests.

Stand size

The number of hectares (acres) a forest covers also determines what species will live there. Many plants and animals are edge species that thrive in small patches of forest, interspersed with fields, roads and clearcuts. But other species are usually found 200 metres (200 yards) or more from an edge because the plants prefer to grow in moist shade and animals escape the predation, parasitism and competition that occurs at the edge. These are called forest interior species like the goshawk, green twisted-stalk and gold-fringed lichen. They require large blocks of forest unbroken by even roads or rights-of-way.

Landscapes

Nova Scotia's climate, its complex geology, and our long history of forest use have resulted in a patchwork of forest types between Cape St Marys and Cape North. Biologists, foresters and others have examined these patterns and developed a classification system that maps the province into landscapes, each having characteristic climate, physical features and forest types. For example;

- the Atlantic Coastal Plain, a strip along the province's Atlantic coast, forested in white spruce and fir, is the best place to find fox sparrows and blackpoll warblers
- the long smooth topped Cobequid Mountains have hardwood forests with red spruce growing on steep sided river systems, with rare long-tailed shrews living in the talus slopes
- to the west of the Strait of Canso a mosaic of hardwood hills set in black spruce and larch wetlands is called the Mulgrave Hills;
- and on the flat high land of the Cape Breton Boreal Plateau a harsh climate means a perpetual forest of balsam fir where moose are very plentiful.

By knowing which landscape your forest lies in, you can understand what trees will grow on your woodlot. Combined with knowledge of how your forest will change over time, biologists can also predict what wildlife species will share your woodlot with you.

In summary, good forest habitat means that forest landscapes are a mosaic of stands in all age classes representing successional stages common to the landscape. The stands should also be a mixture of

sizes including a few very large stands to provide habitat for the forest interior species. Most of Nova Scotia's woodlands are made up of many small woodlots. Owners of small holdings are encouraged to manage their woodlots as a unit and consider the effects of their forest management on wildlife habitat for the whole landscape. It is unnecessary to provide every successional stage and a mixture of stand sizes on every woodlot.

Provincial Standards

1. Areas to be clearcut should not exceed 50 hectares (125 acres).
2. If clearcuts larger than 50 hectares (125 acres) are necessary due to insects, disease, fire or blowdown, leave wildlife corridors such that the maximum clearcut size is 50 hectares, or create clearcuts that conform to the natural disturbance pattern of the forest type that you are operating in. Consult the regional wildlife biologist or forestry staff in your area for advice.
3. Wildlife corridors must have a minimum width of 50 metres (165 feet) and should be composed of green long-lived, wind-firm trees. Corridors should join up with other corridors or uncut areas. Skidding trails through corridors should be narrow and located on high ground, and angled to the forest edge so that animals using the corridors will be concealed. Up to 40% of the volume may be removed from the corridor every 10 years using harvest methods that result in a uniform and wind-firm forest cover throughout the corridor.
4. Clearcuts should follow stand or landform boundaries to create irregular clearcut boundaries.
5. Avoid clearcutting stands adjoining a clearcut area that would result in a total clearcut greater than 50 hectares (125 acres) until the desirable regeneration in the original clearcut is at least two metres (six feet) tall, or provide a wildlife corridor, or create clearcuts that conform to the natural disturbance pattern of the forest type that you are operating in.
7. Harvest methods that promote natural regeneration of climax species characteristic of the landscape are preferred.
8. Eight percent of the forested landscape should contain old growth forests of climax species characteristic of the landscape.
9. All roadsides, pond edges, landings and other disturbed sites that will not be used for growing trees should be seeded with an appropriate grass mixture where soil conditions allow. Roadside ditches should be seeded with grasses to prevent erosion, stabilize the roadbed and minimize shrub growth.

RECOMMENDED SEEDING MIXTURES FOR ROADSIDESDNR Wildlife Mix

OR

Nova Scotia Highway Mix (mix the following 10:1 with white clover)

40% creeping red fescue
20% birdsfoot trefoil
10% white clover
10% orchardgrass
10% alsike clover
10% Kentucky bluegrass

40% creeping red fescue
15% timothy
15% tall fescue
10% Kentucky bluegrass
10% alsike clover
5% red top
5% annual ryegrass

STREAMS, RIVERS, WETLANDS AND LAKES

Riparian Zone

The strip of land that borders streams, wetlands and lakes is called the riparian zone. Here, the combination of water and dry land habitats results in one of the richest communities of animals and plants found anywhere in the landscape. The zones are also used as travel corridors and dispersal routes followed by generations of animals like deer, bobcats and wood turtles. But most importantly the trees and smaller vegetation in the zone protect water quality and provide food and habitat for aquatic plants and animal life.

Trees and smaller vegetation in the riparian zone play five important roles:

1. Shade and temperature control

The temperature of the stream water is one of the important factors that determines what types of plants and animals live there. For example, speckled trout thrive in water that is 14E to 16E C. But spring and summer sunshine can raise the temperature of exposed stream water above 20E C. At that temperature trout stop feeding and reproducing and may become more susceptible to predation and disease. The cool water species depend on trees and shoreline vegetation to provide a canopy over the stream to shade the water during critical times of the year. Any species of tree or shrub can provide shade.

2. Filter silt and nutrients

Water from rain or melting snow that does not soak into the ground, runs over the land to the nearest stream. This water can carry away silt and sand and remove important plant nutrients like calcium, phosphorous and nitrate from the soil and decaying vegetation. However forest grasses, shrubs, tree roots, stems and woody debris, slow the water down and cause the silt and sand to settle out. The dissolved nutrients are taken up by the growing vegetation. If a forest harvest is conducted near a stream, a strip of relatively undisturbed vegetation left in the riparian zone will catch the silt and sand and remove most of the excess nutrients from any overland flow of water from the harvest site.

3. Stabilize stream banks

The roots of forest vegetation hold the stream bank soil in place and slow the rate of natural erosion. The stream water swirls around these roots and rocks and creates undercut banks and an irregular shoreline where aquatic animals find cover and feeding sites. The more irregular and undercut the banks, the greater the number of fish, invertebrates, mammals and amphibians that can live in and near the stream. With roots keeping the stream channel in

place, the stream stays narrow and the water deep, stabilizing water temperatures and providing habitats for larger fish.

4. Allochthonous material

The water in Nova Scotia's streams is usually infertile. Aquatic life get most of their nutrients from material that falls into the stream. Twigs, leaves, bark, grasses and other organic material become the base on which algae will grow. The algae is eaten by tiny invertebrates that are eaten by larger invertebrates, and so on up the food chain. Insects falling into the water are eaten by larger animals. The plant parts and animals that fall into the water are called allochthonous [c lok3 thc ncs, *adj.* foreign in origin; introduced] material, and this is the energy source that keeps the aquatic food chain going. Maintaining an even cover of trees and smaller vegetation overhanging a body of water will ensure food for aquatic life.

5. Large woody debris

Large branches and tree trunks that fall into the water become lodged in the stream banks and bottom. This creates pools and gravel riffles where fish find shelter and sites to lay their eggs. The lodged woody debris also slows water flow reducing the natural erosion processes and the chance of downstream flooding. However too much debris in the stream, especially small branches and leaves, can be a barrier to fish passage, block water flow and deplete the water's oxygen necessary for aquatic animals. So tree harvesting operations should keep logging debris well back from the water where there is no chance it will be washed into the stream.

When forests are harvested near streams, special management zones should be established along each side to leave enough vegetation for stream protection and to maintain the rich wildlife community. Special management zones at the top of the watershed protect the small streams where fish lay their eggs and hatching fry find food and cover during the early part of their lives. The zones also ensure that cool, clean, nutrient rich water is provided to aquatic life in the rest of the river.

Provincial Standards

1. All watercourses and associated wetlands with an average width of 50 cm (18 inches) or more within the forestry operation, must have a special management zone of at least 20 metres (66 feet) on each side to protect the aquatic resource. Extra width will be required in the following cases:

- a) for slopes in excess of 20%, add one metre (three feet) of width for each 2% of slope to a maximum zone width of 60 metres.

b) in areas of unstable soil, poor drainage or to protect significant wildlife habitat, additional width will be required. Consult the regional wildlife biologist or forestry staff in your area for advice

2. On the edge of watercourses less than 50 cm (18 inches) wide, all merchantable trees may be removed taking care to leave at least a 20 metre (66 feet) wide strip of immature trees, shrubs and herbaceous vegetation intact.

3. To minimize blowdown in the special management zone and to encourage natural regeneration, up to 40% of the volume may be removed from the special management zone every 20 years, using harvest methods that result in a uniform wind-firm forest cover throughout the zone. No trees should be removed from slopes of 60% or more.

4. Except when using a road and approved stream crossing, no vehicle used for forest harvesting is allowed within 10 metres (33 feet) of a stream with an average width of 50 cm (18 inches) or more, or within five metres (16 feet) of a stream less than 50 cm (18 inches) in average width. In areas of erodible soil or where rutting may occur, harvesting should be done only when the soil is dry or frozen, otherwise a wider machine exclusion zone should be used.

5. Do not allow woody debris from a forestry operation to enter a stream, river, wetland or lake and keep it out of areas that are periodically flooded.

6. Zone measurements are generally taken from the edge of the defined stream bed even when no water is present. When streams are bordered by grassy, intermittently flooded meadows or wetlands, measure from the forest/wetland edge.

7. When removing 40% of the volume in special management zones:

a) remove trees that have a high risk of blowdown

b) leave dead trees standing where safety allows

c) leave two or three of the largest trees per 100 metres (330 feet) of each shoreline.

8. Temporary and permanent stream crossings and road construction near watercourses must be done in accordance with standards given in the publication *Woodlot Roads: Stream Crossings* available from the local office of the Nova Scotia Department of Natural Resources and *Watercourse Alteration Specifications* available from the local office of the Nova Scotia Department of Environment.

9. Laying out special management zones requires a great deal of on-site interpretation. When in doubt consult the regional wildlife biologist or forestry staff in your area for advice.

CAVITY TREES, SNAGS AND DOWNED WOODY MATERIAL

At least one third of Nova Scotia's wild animal species use cavity trees and snags during their life. Woodpeckers are the best known cavity users but other birds such as owls, chickadees, and mergansers use holes in trees. Squirrels, bats, snakes, insects, spiders and other invertebrates use cavities too. Raccoons, porcupines and bears use large cavities in trees. Even when they fall, rotting trees provide habitat for wildlife. Decaying logs also provide nutrients, retain moisture and contribute to the future site productivity. Rotting and fallen trees make a significant contribution to the structural diversity of the forest and to the biodiversity of the ecosystem.

Clumps of standing trees scattered across any harvested area should be left for cavities and snags during the next rotation. Large diameter trees are preferred because they provide opportunities for animals of all sizes. Poplar and fir are used most often for cavities, but most tree species are suitable. Trees that also provide food and perch sites are the best ones to leave for wildlife. Living trees with dead tops or broken limbs will provide cavities for a longer time. As the new forest matures, the trees in the clumps will grow in diameter, begin to rot and die providing important habitat in the new stand. During this period of growth the clumps should not be cut during silviculture treatments.

The best way to lay out a clump of trees is to find a good candidate cavity tree (large diameter, partially dead or showing signs of decay), and use it as the centre of the clump. Mark enough trees around it to give you the correct number of trees per clump (see table below). Continue this procedure until you have enough clumps for the harvest area. In this way you will keep your best candidate cavity trees and they will govern how the clumps are distributed.

Most forest harvesting operations leave an adequate amount of woody material on the ground to provide for downed woody material over the next rotation. Rot, stain, forked stems and unmanagable large diameter trees mean that material of all sizes is left on the site to provide habitat, return nutrients and maintain moisture. However special care needs to be taken in harvest operations that remove the whole tree from the site (full tree logging). Besides the clumps left for cavity trees, large, freshly cut tree boles should be left to provide downed woody material over the next rotation.

Provincial Standards

1. Leave dead trees standing wherever it is safe to do so, particularly in wildlife corridors and along streams and lake shores. Safety procedures outlined in *The Forest Professional: a code of practice for the Stewards of tomorrow's forests* (available from the Nova Scotia Department of Labour, Occupational Health and Safety Division) must be followed.

2. Leave at least ten trees per hectare (four per acre) as wildlife trees in forest harvest and silviculture treatments that create a continuous treated area of more than three hectares (seven acres). A mixture of live and dead trees is best. For safety and efficiency trees should be in clumps scattered throughout the treatment area following the table below. These clumps should be maintained through the life of the stand especially where silvicultural operations are planned to remove unwanted trees.

Number of Clumps Recommended

<u>Treated Area (ha)</u>	<u># Trees Required</u>	<u># Clumps Recommended</u>
0 - 3	0 - 30	0 - 1
3.1 - 6	30 - 60	1 - 2
6.1 - 12	60 - 120	1 - 3
12.1 - 17	120 - 170	2 - 4
17.1 - 23	170 - 230	3 - 6
23.1 - 30	230 - 300	4 - 8
30.1 - 50	300 - 500	5 - 10

3. An additional ten trees per hectare must be left in clumps or an additional 150 metres (500 feet) per hectare of freshly cut tree bole with a diameter equal to or larger than the average diameter of the stand, must be left, distributed throughout the harvested area.

SIGNIFICANT WILDLIFE HABITATS

Most of our forests can provide for an animal's needs for feeding, breeding and wintering if the stands are the right age, stand size and tree species composition for the animal in question. Plants too have a wide distribution within the limits of climate and soils required by each species. But sometimes one forest may have special features that make it more important to certain wildlife than a similar forest nearby. It could be the presence of a large pine on the shore of a shallow feeding area that is used by nesting eagles, or a collection of stands at the base of higher ground that white-tailed deer have learned to use as a wintering site. It could be alkaline soils resulting from underlying gypsum deposits that support rare plants, or a remote old growth forest where the pine marten is still found or a colony of great blue herons is nesting. Sometimes we don't know what the special feature is that attracts a species to one area over another.

These special areas are called significant wildlife habitats. A significant wildlife habitat is a site that:

- is one of only a few in the province, and/or
- is used by plants or animals having a low population in the province (species at risk) and/or
- is used by unusually large concentrations of wildlife.

Staff at the Department of Natural Resources, the Nova Scotia Museum, most universities, naturalist clubs and devoted amateurs have been recording information about significant habitats for many years. These habitats include raptor nests, heron colonies, deer yards, turtle nesting areas, rare plant locations, important fish spawning areas and many more. Recently, Natural Resources has begun gathering these records and developing maps of known significant wildlife habitats for the province. These maps support wildlife studies to determine why these sites are so important to each species. But more importantly, the maps help develop management plans that allow for the conservation of important wildlife sites.

Habitat conservation does not demand that all habitat areas should be reserved exclusively for wildlife. Instead it asks that the land be used wisely so that habitats are not destroyed and their value for wildlife is maintained. This requires an understanding of the habitat requirements of wildlife and a willingness to include these requirements in land-use plans. In some cases, wildlife habitat conservation may suggest that a portion of a site be set aside for wildlife. More often, it will require that work be scheduled at one season rather than another, or that activities take place in such a way that habitat values can be preserved while the site is being used for economic, recreational, or other uses.

It is important that forest owners and operators have a good knowledge of wildlife using their properties. To get help with this and to obtain information about known significant habitats in your area, or to report habitats you may feel are significant to wildlife, contact the regional wildlife biologist at the Department of Natural Resources. They can provide helpful information about wildlife habitats on your woodlot and any special precautions needed to protect the value of the site. Most significant habitats should be dealt with on a case-by-case basis since each has special features that affect the conservation measures taken.

Standards

1. Prior to any forestry activity contact the local regional biologist or forestry staff to determine if there are any known significant wildlife habitats in the area under management. They will provide the best management practices that should be followed for the conservation of each site.
2. Report any significant wildlife habitats you find to your local office of the Department of Natural Resources. All information provided will be kept in strict confidence.

DEFINITIONS

Clearcut - an area of forest land from which all merchantable trees have recently been harvested and includes any type of cutting in which all trees that cannot be utilized profitably are left.

Climax species - plant species that have evolved under a given climate, occupying a particular physical site and able to perpetuate their species= dominance under a particular natural disturbance regime.

Coarse woody debris - large pieces of dead and downed woody material including stems and branches generally over 10 cm (4 in) in diameter.

Forest - generally, an ecosystem characterized by a more or less dense and extensive tree cover. More particularly, a plant community predominantly of trees with associated woody, herbaceous and bryophyte vegetation and associated faunal communities both above and below ground.

Habitat - the place where wild animals, plants, and other organisms live or occur: that is, where the feeding, breeding, wintering and other requirements of the organism can be met.

Landscape - a unit of land characterized by a specific set of landform, climax vegetation and natural disturbance regime, that repeats across the land base in a distinct pattern.

Old growth - a forest of large old trees, typically with a rather open-canopied, multi-layered forest structure, with greater amounts of coarse woody debris compared to other stages of forest development.

Riparian zone - the transitional area lying between the water's edge of a watercourse and the surrounding upland.

Significant wildlife habitat - a site that is one of only a few in the province, and/or is used by plants or animals having a low population in the province (species at risk) and/or is used by unusually large concentrations of wildlife.

Succession - replacement of one biotic community with another that is better adapted to the altered environmental conditions produced by the first community.

Tree - a stem representing the average in height, diameter and species of the trees within the forest stand which are being harvested.

Vehicle - any vehicle propelled or driven otherwise than by muscular power, whether or not the vehicle is registered pursuant to the *Motor Vehicle Act*

Watercourse - the bed and shore of every river, stream, lake, creek, pond, spring, lagoon or other natural body of water, and the water therein, within the jurisdiction of the Province, whether it contains water or not.

Wetland - land forming part of a watercourse that is saturated or covered with water long enough to promote wetland or aquatic processes as indicated by poor drainage, and vegetation and biological activity that are adapted to a wet environment.

Wildlife - all wild mammals, birds, reptiles, amphibians, fishes, invertebrates, plants, fungi, algae, bacteria, and other wild organisms.

**Regulations respecting wildlife habitat management
made pursuant to Chapter 179 of the Revised Statutes of Nova Scotia, 1989,
the Forests Act**

Citation

- 1** These regulations may be cited as the "*Wildlife Habitat Management Regulations*".

Definitions

- 2** In these regulations

- (a) "bed" means that portion of a watercourse which contains the water at ordinary levels;
- (b) "clearcut" means the harvesting of all trees from an area of forest land and includes a harvest method whereby trees which cannot be profitably utilized are left on the forest land;
- (c) "owner" includes an occupier, lessee or tenant and a person who acts for, or on behalf of, an owner as an agent or contractor;
- (d) "tree" means a stem representing the average in height, diameter and species of the trees within the forest stand which are being harvested;
- (e) "vehicle" means any vehicle propelled or driven otherwise than by muscular power, whether or not the vehicle is registered pursuant to the *Motor Vehicle Act*;
- (f) "watercourse" means the bed and shore of every river, stream, lake, creek, pond, spring, lagoon, or other body of water which contains flowing water for at least part of each year;
- (g) "wetland" means land forming part of a watercourse that is saturated or covered with water long enough to promote vegetation and biological activity which are adapted to a wet environment, but does not include lands periodically soaked or wet as a result of agricultural usage or stormwater drainage; and

Application

- 3** For greater certainty, these regulations apply only to persons carrying out forestry operations in a forest or on forest land.

Snags and Cavity Trees

- 4** (1) Where an owner clearcuts or permits the clearcut of more than three hectares of forest land, the owner shall ensure that ten trees for each hectare of forest land cut are left standing within the area clearcut.

- (2) Trees required to be left standing pursuant to subsection (1) shall be clumped together at not less than thirty trees per clump.
- (3) Trees required to be left standing pursuant to subsection (1) shall not be removed during any subsequent silviculture operation.
- (4)
 - (a) In addition to the requirements of subsection (1), the owner shall leave distributed throughout the area 150 metres of freshly cut tree boles for each hectare cut.
 - (b) Tree boles left pursuant to clause (a) shall have an average diameter equal to or greater than the average diameter of the trees within the stand being harvested.

Special management zones

5 For purposes of sections 6 and 7,

- (a) the average width of a watercourse is determined by measuring the width of the bed of the watercourse at approximately ten equidistant locations along the length of the watercourse and taking the average of the measurements; and
- (b) only that portion of the watercourse that is situated within or adjacent to the forest land where the forestry operation is carried on is required to be measured for purposes of determining the average width.

- 6
 - (1) Where the average width of a watercourse situated on or adjacent to forest land on which a forestry operation is carried on is equal to or greater than fifty centimetres, an owner shall establish or ensure the establishment of a special management zone of twenty metres in width along all boundaries of the watercourse and any wetland which are located within or adjacent to the forest land where the forestry operation is carried on.
 - (2) Where the land on which a special management zone is established pursuant to subsection (1) has a slope of greater than 20%, the owner shall increase the width of the special management zone by one metre for each 2% of slope to a maximum of sixty metres in width.
 - (3) No owner shall, within a special management zone, permit the use of, use or operate a vehicle for forest harvesting purposes within ten metres of the watercourse or wetland.
 - (4) Subject to subsection (5), no person shall harvest more than forty percent of the volume of trees from a special management zone in a twenty year period, commencing with the twenty year period computed from the date of establishing the special management zone.
 - (5) No person who harvests within a special management zone shall create an opening larger than twice the average height of the trees within the special management zone.

- 7 Where the average width of a watercourse situated on or adjacent to forest land on which a forestry operation is carried on is less than fifty centimetres, no owner shall
- (a) permit the use of, use or operate a vehicle for forest harvesting purposes within five metres of the watercourse; or
 - (b) remove or destroy or permit the removal or destruction of shrubs and herbaceous vegetation from the area within twenty metres of the watercourse.

Offence

- 8 A person who does anything prohibited by these regulations or who fails to do anything required by these regulations is guilty of an offence.